

## CLAIMS:

What is claimed is:

1           1.     A flexible display device comprising:

2           a substrate; and

3           an active matrix display backplane coupled to said substrate.

1           2.     The flexible display device as in claim 1 wherein said active matrix display

2     backplane comprises a plurality of blocks that are deposited onto said substrate.

1           3.     The flexible display device as in claim 1 wherein said active matrix display

2     backplane comprises a plurality of blocks that are deposited onto a polarizing film.

1           4.     The flexible display device as in claim 2 wherein said display device conforms to

2     a desired shape of an object which is planar when said flexible display device is attached to said

3     object.

1           5.     The flexible display device as in claim 2 wherein said display device conforms to

2     a desired shape of an object which is non-planar when said flexible display device is attached to

3     said object.

1           6.     The flexible display device as in claim 2 wherein each of said blocks comprises

2     an active circuit element which drives a picture element.

1           7.     The flexible display device as in claim 2 further comprising:

2     a display generation substrate coupled to said active matrix backplane.

1           8.     The flexible display device as in claim 1 wherein said active matrix backplane

2     comprises at least one electrode for each picture element.

1           9.     The flexible display device as in claim 1 wherein said active matrix display is  
2 conformal.

1           10.    The flexible display device as in claim 1 wherein the substrate is flexible.

1           11.    A method of manufacturing a flexible active matrix display panel comprising:  
2           depositing a plurality of shaped blocks onto a flexible substrate, each said block has a  
3 pixel electrode thereon; and  
4           coupling electrically said plurality of blocks to form an active matrix backplane.

1           12.    The method as in claim 11 wherein said display panel conforms to a desired shape  
2 of an object when said flexible display panel is attached to said object.

1           13.    The method as in claim 11 wherein each of said shaped blocks comprises an  
2 active circuit element which drives a picture element.

1           14.    The method as in claim 11 further comprising:  
2           a display generation substrate coupled to said active matrix backplane.

1           15.    The method as in claim 11 wherein said active matrix display backplane  
2 comprises at least one electrode for each picture element.

1           16.    The method as in claim 11 wherein said active matrix display is conformal.

1           17.    The method as in claim 11 wherein the flexible active matrix display panel  
2 comprises a single crystal silicon transmissive display.

1           18.    The method as in claim 11 wherein the flexible active matrix display panel  
2 comprises a reflective display.

1           19.     The method as in claim 11 wherein the flexible active matrix display panel  
2 comprises an organic light emitting diode.

1           20.     The method as in claim 11 wherein the flexible active matrix display panel  
2 comprises an inorganic light emitting diode.

1           21.     The method as in claim 11 wherein the flexible active matrix display panel  
2 comprises upconverting phosphor.

1           22.     The method as in claim 11 wherein the flexible active matrix display panel  
2 comprises downconverting phosphor.

1           23.     A flexible display device comprising:  
2           a substrate;  
3           a passive matrix display backplane coupled to said substrate; and  
4           said passive matrix display backplane comprises a plurality of blocks that are deposited  
5 onto said substrate.

1           24.     The flexible display device as in claim 23 wherein said display device conforms  
2 to a desired shape of an object which is planar when said flexible display device is attached to  
3 said object.

1           25.     The flexible display device as in claim 23 wherein said display device conforms  
2 to a desired shape of an object which is non-planar when said flexible display device is attached  
3 to said object.

1           26.     The flexible display device as in claim 23 wherein each of said blocks comprises  
2 a circuit element which drives a picture element.

1           27.     The flexible display device as in claim 23 further comprising:  
2           a display generation substrate coupled to said passive matrix backplane.

1           28.     The flexible display device as in claim 22 wherein said passive matrix backplane  
2           has a picture element.

1           29.     The flexible display device as in claim 22 wherein said passive matrix display is  
2           conformal.

1           30.     The flexible display device as in claim 22 wherein the substrate is flexible.

1           31.     A method of manufacturing a flexible passive matrix display panel comprising:  
2           depositing a plurality of shaped blocks onto a flexible substrate; and  
3           coupling electrically said plurality of blocks to form a passive matrix backplane.

1           32.     The method as in claim 31 wherein said display panel conforms to a desired shape  
2           of an object when said flexible display panel is attached to said object.

1           33.     The method as in claim 31 wherein each of said shaped blocks comprises a  
2           passive circuit element which drives a picture element.

1           34.     The method as in claim 31 further comprising:  
2           a display generation substrate coupled to said passive matrix backplane.

1           35.     The method as in claim 31 wherein said passive matrix display backplane has a  
2           picture element.

1           36.     The method as in claim 31 wherein said passive matrix display is conformal.

1           37.    The method as in claim 31 wherein the flexible passive matrix display panel  
2 comprises a single crystal silicon transmissive display.

1           38.    The method as in claim 31 wherein the flexible active matrix display panel  
2 comprises a single crystal silicon reflective display.

1           39.    The method as in claim 31 wherein the flexible passive matrix display panel  
2 comprises an organic light emitting diode.

1           40.    The method as in claim 31 wherein the flexible active matrix display panel  
2 comprises an inorganic light emitting diode.

1           41.    The method as in claim 31 wherein the flexible passive matrix display panel  
2 comprises upconverting phosphor.

1           42.    The method as in claim 31 wherein the flexible passive matrix display panel  
2 comprises downconverting phosphor.

1           43.    A plurality of display device components comprising:  
2 a flexible substrate having at least a first length;  
3 said flexible substrate having a second length; and  
4 a plurality of display device components coupled to said flexible substrate, each of said  
5 display device components is separated by at least a third length.

1           44.    The plurality of display device components as in claim 43 wherein each of said  
2 display device components is assembled into a separate display device.

1           45.     The plurality of display device components as in claim 43 wherein each of said  
2 flexible display device components has a backplane comprising a plurality of shaped blocks  
3 which are deposited onto said flexible substrate.

1           46.     The plurality of display device components as in claim 44 wherein said separate  
2 display device components conform to a desired shape of an object which is non-planar when  
3 said separate display device is attached to said object.

1           47.     The plurality of display device components as in claim 45 wherein each of said  
2 shaped blocks comprises a circuit element which drives a picture element.

1           48.     The plurality of display device components as in claim 44 wherein each of said  
2 display device components forms a separate display backplane and a display generation substrate  
3 is coupled to each said separate display backplane.

1           49.     The display device as in claim 48 wherein each said separate display backplane  
2 comprises at least one electrode for each picture element.

1           50.     The display device as in claim 48 wherein each said display separate display  
2 backplane is a passive matrix display backplane.

1           51.     The display device as in claim 48 wherein each said display backplane is an active  
2 matrix display backplane.

1           52.     The display device as in claim 43 wherein the second length of the substrate is  
2 continuous.

1           53.     A method of manufacturing a plurality of display panels on a flexible substrate,  
2     said method comprising:  
3           creating a first display component on a first region of a flexible substrate, said flexible  
4     substrate having a first length and a second length;  
5           creating a second display component on a second region of said flexible substrate, said  
6     second region being disposed along at least one of said first length and said second length from  
7     said first region by a third length, and wherein said first region is for a first display panel of said  
8     plurality of display panels and said second region is for a second display panel of said plurality  
9     of display panels.

1           54.     The method as in claim 53 further comprising:  
2     rolling said flexible substrate through a web processing apparatus.

1           55.     A display device comprising:  
2     a flexible substrate; and  
3     a flexible reflective display backplane coupled to said flexible substrate.

1           56.     The display device as in claim 55 wherein said flexible reflective display  
2     backplane comprises a plurality of shaped blocks which are deposited onto said flexible  
3     substrate.

1           57.     The display device as in claim 56 wherein said display device conforms to a  
2     desired shape of an object when said flexible display device is attached to said object.

1           58.     The flexible display device as in claim 56 wherein each of said shaped blocks  
2     comprises a circuit element which drives a picture element.

1           59.     The display device as in claim 56 further comprising:

2           a display generation substrate coupled to said flexible reflective display backplane.

1           60.     The display device as in claim 55 wherein said flexible reflective display

2           backplane comprises at least one electrode for each picture element.

1           61.     The display device as in claim 55 wherein said display is conformal.

1           62.     The display device as in claim 55 wherein said substrate has at least one recessed

2           region, said recessed region is reflective.

1           63.     A method of processing a flexible substrate, said method comprising:

2           moving a flexible substrate through at least one web process apparatus;

3           dispensing a slurry containing a plurality of shaped objects onto said flexible substrate,

4           said shaped objects being deposited onto receptor regions of said flexible substrate.

1           64.     The method as in claim 63 wherein said flexible substrate moves at a rate of 5

2           inches per minute to 100 inches per minute.

1           65.     The method as in claim 63 wherein a display tape moves at a rate of 5 inches per

2           minute to 100 inches per minute.

1           66.     The method as in claim 65 wherein the display tape comprises a material selected

2           from the group of polyether sulfone (PES), polyethylene terephthalate, polycarbonate,

3           polybutylene terephthalate, polyphenylene sulfide (PPS), polypropylene, polyester, aramid,

4           polyamide-imide (PAI), polyimide, aromatic polyimides, polyetherimide, metallic materials,

5           acrylonitrile butadiene styrene, and polyvinyl chloride.



1           67.     A device for continuously feeding a flexible substrate and a display tape through a  
2 production line to form a display panel comprising:

3           a first drive belt disposed on a first plurality of support members to traverse a flexible  
4 substrate about a stationary point;

5           a second drive belt disposed on a second plurality of support members to traverse a  
6 display tape about the stationary point;

7           said flexible substrate disposed on a first drive belt wherein the flexible substrate has  
8 apertures;

9           a display tape deposited on the second drive belt wherein the display tape has apertures;

10          a slurry comprising a plurality of shaped blocks is placed onto the substrate;

11          a container stores excess slurry;

12          the first drive belt has adjustable fasteners corresponding to the apertures of the flexible  
13 substrate;

14          the second drive belt has adjustable fasteners corresponding to the apertures of the  
15 display tape; and

16          the flexible substrate is coupled to the display tape.

1           68.     The device of claim 67 wherein the flexible substrate is comprised of the material  
2 selected from the group consisting of glass, plastic, and silicon.

1           69.     The device of claim 67 wherein the display tape is comprised of the material  
2 selected from the group consisting of polyether sulfone (PES), polyester terephthalate,  
3 polycarbonate, polybutylene terephthalate, polyphenylene sulfide (PPS), polypropylene,  
4 polyester, aramid, polyamide-imide (PAI), polyimide, aromatic polyimides, polyetherimide,  
5 metallic materials, acrylonitrile butadiene styrene, and polyvinyl chloride.

1           70.     The device of claim 67 wherein said apertures of the substrate are about evenly  
2 spaced.

1           71.     The device of claim 67 wherein said apertures of the display tape are about evenly  
2 spaced.

1           72.     The device of claim 63 wherein the display tape has a top surface and a bottom  
2 surface and at least one of the top surface and bottom surface has a metalization film.

1           73.     The device of claim 67 wherein the display tape is heated.

1           74.     The device of claim 63 wherein the display tape is patterned.

1           75.     A method for continuously feeding a flexible substrate and a display tape through  
2 a production line to form a display panel comprising:

3                 moving a flexible substrate and a display tape;

4                 placing a slurry onto said flexible substrate said slurry having a plurality of shaped blocks  
5 which are designed to be received by receiving regions of said flexible substrate;

6                 coupling said flexible substrate to said display tape;

7                 coupling said flexible substrate to a backplane;

8                 said display tape comprises the material selected from the group of polyether sulfone  
9 (PES), polyester terephthalate, polycarbonate, polybutylene terephthalate, polyphenylene sulfide  
10 (PPS), polypropylene, polyester, aramid, polyamide-imide (PAI), polyimide, aromatic  
11 polyimides, polyetherimide, metallic materials, acrylonitrile butadiene styrene, and polyvinyl  
12 chloride.

1           76.     The method as in claim 75 wherein said display tape is flexible.

1           77.     The method as in claim 75 wherein the display comprises an organic light  
2 emitting diode.

1           78.     The method as in claim 75 wherein the display comprises a light emitting diode.

1           79.     The method as in claim 75 wherein the display comprises an inorganic light  
2 emitting diode.

1           80.     The method as in claim 75 wherein the display comprises an organic light  
2 emitting diode.

1           81.     The method as in claim 75 wherein the display comprises cholesteric liquid  
2 crystal.

1           82.     The method as in claim 75 wherein the display comprises upconverting  
2 phosphorus.

1           83.     The method as in claim 75 wherein the display comprises downconverting  
2 phosphorus.

1           84.     The method as in claim 75 wherein the display comprises electrophoretic  
2 material.

1           85.     The method as in claim 75 wherein the display comprises liquid crystal.

1           86.     The method as in claim 75 wherein the display comprises a polymer-dispersed  
2 liquid crystal.

1           87.     A method of selectively placing an object onto a region of a substrate that forms a  
2 portion of a display panel, said method comprising:

3           dispensing a slurry containing a plurality of shaped objects onto a substrate, said shaped  
4 objects being deposited into recessed regions of the substrate;

5           checking for empty recessed regions in the substrate;

6           placing robotically an object into an empty recessed region of the substrate.

1           88.     The method as in claim 87 further comprising coupling a display material to said  
2 substrate.

1           89.     The method as in claim 87 wherein said substrate is rigid.

1           90.     The method as in claim 87 wherein said substrate is flexible.

1           91.     The method as in claim 87 wherein recessed regions are about a first size and  
2 about second size.

1           92.     The method as in claim 91 wherein an object of about a first size is dispensed in a  
2 slurry onto the substrate, said at least one object is received into a region with a first size.

1           93.     The method as in claim 92 wherein an object about the size of the region with a  
2 second size is dispensed in a slurry onto the substrate, said object is received into a region with a  
3 second size.

1           94.     A method of placing objects onto a substrate, said method comprising:  
2           dispensing a slurry containing a plurality of shaped objects onto a substrate, said shaped  
3 objects being deposited onto a first receptor region of said substrate;  
4           grasping at least one object with a robotic arm and depositing said one object onto a  
5 second receptor region of said substrate.

1           95.     The method as in claim 94 wherein said first receptor region is different in size  
2 than said second receptor region and both are recessed regions in said substrate.

1           96.     The method as in claim 95 wherein said one object is different in size than each of  
2 said shaped objects.

1           97.     The method as in claim 94 wherein said substrate is rigid.

1           98.     The method as in claim 94 wherein said substrate is flexible and is processed  
2 through support members in a web process.

1           99.     The method as in claim 94 wherein the first receptor region of said substrate is the  
2 equivalent size to the second receptor region of said substrate.

1           100.    A method of depositing a display material through an in-line process on a flexible  
2 substrate to form a plurality of display panels, comprising the steps of:  
3           depositing a display material onto the flexible substrate in a first region of the flexible  
4 substrate; and  
5           depositing said display material on the flexible substrate in a second region of the flexible  
6 substrate, wherein said first region is for a first display panel and said second region is for a  
7 second display panel or another portion of said first display panel.

- 1           101.   The method as in claim 100 wherein a backplane is coupled to the flexible  
2   substrate.
- 1           102.   The method as in claim 100 wherein the backplane is flexible.
- 1           103.   The method as in claim 100 wherein the display comprises a liquid crystal  
2   material.
- 1           104.   The method as in claim 100 wherein the display material comprises an  
2   upconverting phosphorus.
- 1           105.   The method as in claim 100 wherein the display material comprises a polymer-  
2   dispersed liquid crystal.
- 1           106.   The method as in claim 100 wherein the display material comprises cholesteric  
2   liquid crystal.
- 1           107.   The method as in claim 100 wherein the patterning of the display material is by  
2   laser etching.
- 1           108.   The method as in claim 100 wherein the patterning of the display material is by an  
2   ink jet.
- 1           109.   The method as in claim 100 wherein the patterning of the display material is by  
2   screen printing.
- 1           110.   The method as in claim 100 wherein the patterning of the display material is by  
2   deposition.

1            111.    The method as in claim 100 wherein the patterning of the display material is by  
2    lithography and etching.

1            112.    The method as in claim 100 wherein a metal interconnect is deposited onto the  
2    first region of the substrate.